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ABSTRACT

This paper proposes a two-part, basic computer literacy program for university faculty, staff, and students with no prior exposure to computers. The program described would introduce basic computer concepts and computing center service programs and resources; provide fundamental preparation for other computer courses; and orient faculty towards developing educational computing applications. An introduction and an explanation of the conceptual framework are followed by a description of the project, which would consist of two sets of 15 independent modules. Each module would include a 30-minute videotape program, a related short lecture, and independent, hands-on working experience with microcomputers. Support for the proposal includes descriptions of the instructional environment, target population, prior student competencies, learner needs, and instructional needs. Part 1 of the course (Computer Literacy; General Concepts) covers 24 topical goals, and Part 2 (Applications of Computer Based Education) covers 17. Commercially-available instructional resources are specified with title, author, publisher and cost, and in-house production costs are itemized. A proposed implementation plan describes activities for each project phase and specifies formative and summative evaluation procedures. (LMM)

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COMPUTER LITERACY PROJECT

A General Orientation in Basic Computer Concepts and Applications

Professional Development Program Proposal

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I. Introduction

The impact of microcomputers and other related microelectronic technology systems, has been steadily transforming our society into another era. This new era, sometimes referred to as the "information age", will potentially change our economy and our way of life as we know it today. Microminiaturization techniques have brought the price of a general purpose computer to the point where it is affordable and within the means of many. Computers are already changing how millions of people perform their job functions within their various working environments. They also have provided entertainment for many in their homes.

Computer utilization has steadily grown in other industrialized nations such as Japan, the United Kingdom and Canada. In many cases, these countries are developing massive efforts to bring about a certain level of computer literacy within their respective nations. The total extent to which computers are increasing in other countries is not known. However, if the United States is to compete economically in the world market, similar commitments must be made.

In several states across the United States, computer literacy projects have been implemented at the elementary

and secondary levels. These programs have reported continuing success. Business and industry has, for several years, included computer concepts and applications as part of their corporate training and development efforts.

There is a need to close the gap between what is offered at the elementary and secondary level and what is offered, and in many cases, required in the business and industrial community. There also needs to be an element of mutual assistance and support among the various levels of effort involved towards these endeavors.

I.1 Conceptual Framework:

A basic computer literacy program is defined as providing "whatever understanding, skills and attitudes one needs to function effectively within a given social role that directly or indirectly involves computers" (Anderson and Klassen, 1981, p. 131). This definition can be expanded to fit various computer literacy requirements of individuals as well as specific groups. However, we should keep in mind that our target population are those people who completed their education before computers were common. At the University, this group includes faculty and staff as well as students who did not have exposure to computers in school. They may not necessarily want to learn computer programming, but they do need to know enough about computers to dispel the fear and awe of this technological area.

Furthermore, they need to know enough about computers to interact with the organizational computing support sections in order to use the various facilities and/or services to meet their individual job demands or requirements. To foster this kind of communications interchange, one must have some knowledge of the vocabulary of computing.

Also, in the case of educators or personnel with training functions, it is important to understand both the concepts and methods of computer based education. This population is particularly important because their role will be to use computer technology in their programs as a tool and educate their clientele in the use of computer applications and regular every-day simple utilization.

I.2 Program Description:

This program will serve five basic functions. First, and of paramount importance, is the fact that it is designed to introduce basic computer concepts to the person who has no previous knowledge in that area. Secondly, the program will introduce these people to the various service programs and resources of a computing center. The program will also provide the fundamental preparation for clients who wish to enroll in the existing short courses offered through the computing center and elsewhere and insure a certain amount of success in these courses. The program may encourage and prepare people to enroll in regular computer courses offered through the computer science department and other

departments as well. Finally, the program will begin to orient faculty towards developing educational applications for the existing computer technology.

Generally the program will consist of fifteen independent modules. Each module will include a 30 minute videotape program, a related short lecture and an independent working exercise. These working exercises will take the form of a learning package and actual hands on experience with microcomputers. In addition, they will have opportunities to use the microcomputer programs such as interactive learning programs, graphic design programs and word processing programs. Opportunities will be provided to the participants to develop their own simple programs. The participants will also have access to all materials including videotapes for replay and review at any time. Although the program is designed to present each module in sequential order, each unit can be used independently to meet the specific needs of a particular group or workshop.

I.3 Frame of Reference

Prior to considering the development of any new program, one must identify and consider any possible restraints that might be imposed. The most common variable would be budgetary restrictions. Many people are aware that some educational institutions across the United States are experiencing dwindling enrollments. In many cases, budgets are directly related to earned tuition. This condition has

had some impact on the development of new programs. In other cases, institutions have experienced decreases in state funding levels due to decreases in state revenue. The University of Kentucky falls in this category. It is felt that a computer literacy program would help to rectify this condition. Generally speaking, a computer literate population could attract new business and industry into the Commonwealth. This, in turn, would broaden the tax base and have an impact on improving the overall economic conditions of Kentucky. For these reasons, many colleges and universities have sought out funding support from outside sources. Many businesses and industries have funded programs that would be mutually beneficial.

For example, in the case of providing a computer literacy program, area business would be able to draw personnel from local populations that would have some knowledge of computer technology. This would save them the expense of importing talent. Secondly, cooperative agreements could be worked out in such a way that local businesses could borrow the acquired training materials such as video-tapes, films and packaged materials to be used in in-plant training and development. University personnel could also agree to provide a certain amount of assistance in setting up these workshops. The University will also provide preventive maintenance for the resources. Many corporations do not have the facilities to provide these services. Finally, corporations would receive tax credits for their

contributions. These kinds of cooperative ventures could build bridges between business and industry and the educational community that would foster opportunities for professional growth and development for each group.

II. Instructional Environment:

To facilitate learning, classrooms should be provided which would serve various types of instruction and provide the use of a variety of technologies and delivery systems. The self-contained environment should promote both teacher-centered and learner-centered instruction. Where a teacher-centered environment exists, professionals should be used as the primary means of conveying information.

Educational technology should be used in harmony with the other inter-related elements. After short courses and workshops introduce various concepts, the instructional resources used should be available for the students to review at their own leisure. This would encourage and support a learner-centered, individual-oriented approach. It is essential that learners meet the expectations of his environment. Each unit should also be limited to those aspects that contribute to the attainment of the goals and objectives of that unit. "User friendly" programs should be used on the terminals and should be designed to reinforce the concepts presented by the professionals and the media resources. Professionals should also make themselves available for personal consultation.

II.1 Target Population

The population that will be the recipient of this program can be classified into three major groups within the university community. Depending on individual requests, a fourth group may be included. They are as follows:

Teaching Faculty:

Teaching faculty generally range between 25 to 65 years of age. They are male and female and the group can be identified as having a medium to high level of ability. They cross several discipline lines and their interests would be for personal use as well as for adapting computer technology to instructional and research applications. They should have a positive attitude as many are from a traditional background, they may feel uneasy about technology.

Support Staff:

Support staff may range between 18 and 65 years of age. This population consists of both males and females. Their ability level may range from low to high. Their occupational background may be representative of clerical, technical, service or administrative functions. This group's primary interest most likely will be in the use of computers for word processing and various business or administrative tasks.

Students:

The student population may range between 17 and 24 years of age. This group may also have adult learners represented at the undergraduate, graduate and continuing education levels. They also include male and female representation. Ability levels will range from low to high. Their interest levels will also vary. Their interest in learning about computer fundamentals would be to use the computer as a tool for learning. They may also have personal or future vocational interests. A computer literacy program aimed at students who have had no exposure to computers in their current curriculum would be most beneficial.

Community Participants:

This group consists of representatives from local business and industry. They can be both male and female in gender. The general age range should be between 17 and 65 years of age. Their ability level will also range from low to high. This population's major interest should be to develop basic skills in computing in order to meet prerequisites for more advanced training. This advanced training might include business application topics. In addition, these needs may be met by individual modules rather than the total program. Special arrangements should be made to accommodate the needs of contributors to the program.

Each group has diversity within the classifications and different levels of formal academic preparation. The overall aspirations of each member of the various groups should be to broaden their awareness and involvement with computer technology. Positive attitudes towards computing and computing support services should also emerge as a primary element. The population groups should also be aware of the various other learning opportunities offered through the regular University curriculum and through other short courses and workshops offered on campus.

II.2.1 Prior Competencies:

The target population should have little or no formal training in computing or computer science.

II.3 Learner Needs

The Need for Increasing Knowledge:

Each person within the total population has a need to increase his or her knowledge of what a computer is, what it does, and what it does not do. Furthermore, they need to develop an understanding of the history of the development of the computer and its influence and impact on society. There is also a need to know how a simple program is constructed and how a computer interprets program instructions. The level of knowledge will be defined by each individual's intellectual abilities.

The Need to Perform Skills:

The population needs to be able to engage in various manipulative or motor skills related to the general operation of a basic computer system. These psychomotor skills should include such topics as getting on and off of the computer, using input devices such as alphanumeric keyboards, assembling a simple micro system, inserting a disk in a disk drive and other related types of activities that allow individuals to perform on the computer.

The Need to Develop Attitudes:

It is understood that many of the population have unwarranted fears (cyberphobia) concerning computer technology. There is a perceived need to overcome this fear, develop learner interest and generally create new attitudes towards an appreciation of computers. The population will also place a higher value on computing and the services provided by organizational computing centers. Finally, the learner should formulate enough confidence that he or she will utilize the various computing services on campus and perhaps develop an interest in using personal computers at home or at their place of employment.

III. Topical Goals

Part I

Computer Literacy

Part I is designed to provide a basic orientation and general overview of computing. This would include a historical background, computer implications on society, procedural thinking, introduction to computing hardware and software and an introduction to programming concepts in BASIC. It will also provide information to the participants concerning the availability of resources to support computing activities. In some cases, this program will serve as a prerequisite to entering other courses or advanced programs.

General Concepts:

To provide a general overview of the computer revolution and its implications on education, the community and society in general.

To provide a historical background of the development and growth of computers and to examine computing as a change agent.

To discuss the myths and unwarranted fears of cyberphobia, and determine what a computer can do for the individual.

To introduce the concept of procedural thinking and systematic problem analysis.

To define a basic computer system and its individual components.

To introduce the various differences between hardware and software.

To introduce the central processing unit (CPU) and provide a conceptual understanding of its function.

To discuss binary code and how the computer uses the code.

To discuss the main memory system of the computer and to examine the different types of memory (ROM) and (RAM).

To examine the keyboard and identify various function keys.

To examine external storage devices and understand how information is stored.

To identify the differences between sequential processing and random access processing.

To examine peripherals or interfaces (input/output) devices, terminals, etc. and how they work.

To explore various kinds and types of hardware and differentiate between a micro, a mini computer and a mainframe.

To determine the difference between batch processing and interactive processing.

To examine and compare various microcomputers and their special functions.

To define an operating system and its function.

To provide an overview of programming languages.

To use procedural thinking to develop a simple flowchart.

To introduce BASIC as a programming language and to develop an understanding of the fundamentals of programming.

To review various application programs. This would include word processing, graphics, spreadsheets, etc.

To explore the various implementations of application programs such as data bases, etc.

To review standards and guidelines for the selection and evaluation of computer software.

To provide information to participants on University, local and regional computing resources. This would include a mediated tour of the computing center, an overview of short course offerings through the Computing Center User Services Group, a listing of micro computer user groups, consortia and professional organizations.

Part II

Applications of Computer Based Education

Part II is designed to develop an understanding of various computer applications to educational or training problems. This part will also consist of fifteen independent modules of instruction. As concepts of computer based education are recent developments, good commercially available learning resources are not readily available. Therefore, most of the materials will be produced in-house. The basic computer literacy program or its equivalent will be a prerequisite to entering the program on computer based education applications.

Educational Applications:

To introduce the concepts of computer based education and/or training and examine its fundamental characteristics.

To develop an understanding of the research findings in computer applications to the teaching and learning process.

To provide an overview of current trends and future implications of computer based education.

To orient the participants to the various types of computer based education applications and summarize the strengths and weaknesses of each.

To examine the various types of computer based education programs such as CMI, CAI, Simulation, CAT, CAL, Interactive Video, etc.

To encourage strategies that will develop feasibility studies towards determining the appropriate use of computer based education.

To discuss ways of integrating computer based education with other more traditional teaching or training strategies.

To develop an understanding of the advantages and disadvantages of different system configurations.

To review selection factors for computer based education systems (hardware considerations)

To review selection factors for computer based education systems (software characteristics and courseware characteristics).

To review basic instructional design concepts as they apply to computer based training.

To review selection factors for computer based education system performance and support characteristics.

To develop a strategy for designing in-house produced courseware.

To develop skills for using an authoring language.

To utilize the computer in the development and production of instructional materials (i.e., instructional computer generated graphics).

To develop an understanding of formative and summative evaluations of computer based education.

To provide an overview of future developments and current limitations of computer based instruction.

IV. Instructional Needs

Instruction will take the form of conventional lectures, mediated instruction and actual hands-on utilization in a micro computer laboratory. The intent is to provide a wide and varied educational program. Because of the broad spectrum of diversity among the members of the population, efforts to mediate lectures will be made. These efforts should equalize learning opportunities whenever possible. The instructional intent will be to reach the learner directly with mediated experiences. These instructional resources will be placed in a learning laboratory type of environment and the learners will have opportunities to review the materials at their leisure.

Instruction will be presented sequentially. Within the sequence, progressive levels will be developed which will lead the learners towards achieving pre-determined goals and objectives. In the event that a learner misses a workshop or lecture, handouts and outlines of the sessions will be provided. Modules could also be used separately and independently if specific requests were made by a given population.

IV .1 Instructional Resource Needs

Instructional resources will include commercially produced materials as well as in-house produced materials. Whenever possible, the in-house developed materials will be tailored to meet specific population needs. Also, the in-house produced materials will be developed to cover topical areas not included in the commercially available materials. Where necessary, in-house produced materials will expand concepts that were presented to better explain them or simplify them for the specific population.

Instructional Resources:

I. Videotape Series: (30 min. ea.) color (1/2" or 3/4") $4300.00
   A. Computers at Work: Concepts and Applications
      Published by: Mitchell Publishing, Inc.,
      915 River St., Santa Cruz, Ca. 95060
      1. Evolution: Computers Yesterday and Today
      2. The Computer System: Machines and People
      3. Hardware and Software
      4. Sequential Processing Applications
      5. Direct Access Applications
      6. Systems Development: A Case Study
      7. Computers in Business
      8. Computers in Society
      9. Teleprocessing Systems
      10. Distributed Processing Systems
      11. Database Processing Systems
      12. Microcomputers: The Personal Assistant
      13. The Automated Office
      14. Computer Crime and Security
      15. Computer Careers: You and the Future

   B. Instructor's/Administrators Guide

II.	Computers Today (Learning Package) (1 ea)	est.$ 400.00
	A. Computers Today, by: Donald H. Sanders, McGraw-Hill Book Company, Hightstown, NJ 08520 (Text).	
	1. Tutorial Diskette (Programming Analysis and Programming in Basic) (0-07-054694-0)	
	2. Inside Computers Today: Study Guide (0-070-054682-7)	
	3. Overhead Transparencies (0-07-075029-2)	
	4. Slide Package (0-07-054696-7)	
	5. BASICARD (0-07-054693-2)	
	6. Instructors Resource Kit (0-07-079205-4)	
III.	Apple IIe Personal Computer (Basic System) (2 ea) (with color monitors)	$4000.00
	1. B402 Digitizing Tablet and stylus (1 ea)	$ 795.00
	2. Dot-Matrix Printer (1 ea)	$ 500.00
	3. Graphics Software Package (1 ea)	$ 200.00
IV.	IBM PC (Basic System) (6 ea)	$12,000.00
	1. Color Display with Monitor Adapter (2 ea)	$1,500.00
	2. Monochrome Display with Monitor/Printer Adapter (4 ea)	$2,200.00
	3. Graphics Printer (1 ea)	$ 475.00
	4. IBM DOS 2.0 and BASIC (6)	$ 300.00
	5. PC Tutor, Published by: Comprehensive Software Support, PO Box 90833, Los Angeles CA 90009 (2 ea)	$ 160.00
V.	Videoslide 35 Computer Graphics Camera Lang Systems, Inc., 1010 O'Brien Drive, Menlo Park, CA 94025	
	A. Videoslide 35 Camera Unit (1010-1000)	$2599.00
	1. Interface	
VI.	Kodak Caramate Slide Projector/Viever	est. $ 300.00
VII.	BCD 400 Standard Hardware System (Interactive Video Interface) 5809 S.W. 5th St., Suite 101, Oklahoma City, OK 73128	
	A. BCD 400	$ 595.00
	1. BCD 400 Interface Board	
	2. VTR Control Cable	
	3. Complete audio/video cables	
	4. Operational Software (Logger1)	
	5. Instruction Manual	
	6. Software Update Registration Card	
	7. NTSC/PAL Compatible	
VIII.	Panasonic Video Tape Recorder(NV-8200)	$1178.00
	A. VHS W/2 Channel Audio	
IX.	Panasonic Monitor CT1300MRG 13" Color Monitor with Audio, RGB-TTC inputs, 8 pin.	$ 468.00
X.	Kroy 80 Lettering System with 6 Type disks and 25	est. $ 600.00

Tape Cartridges

XI. Miscellaneous Materials — est. $ 600.00
15 1/2" VHS blank video cassettes
15 3/4" U-MATIC blank video cassettes
2 pkgs. Heavyweight 3M transparency films
2 pkgs. Mounting frames (for transparencies)
25 rolls Professional 35mm film
5 Blank audio cassette tapes

estimated total $33,170.00

V. Program Implementation Plan

Upon approval of the project and receipt of the appropriate financial support, the following implementation phases will be engaged:

Phase I: (Acquisition)

During this phase, commercially available materials will be ordered from the distributing companies. The software will be reviewed and inspected for defects and content quality. The microcomputers and other related supporting equipment will be purchased. When the equipment arrives, each item will also be examined to insure that they meet the prespecified standards.

Phase II: (Design)

During the design phase, independent modules will be designed. This phase will include lesson descriptions, defining unit content and rationale, citing of specific learning objectives, defining learning resources, defining learning exercises, citing evaluation strategies for each unit and finally, listing the criterion for success of each of the independent modules.

Phase III: (Instructional Materials)

After the independent modules are designed, in-house produced materials will be developed. This phase would

include the design and development of overhead transparencies, 35mm slides, videotapes and various related printed materials and handouts.

Phase IV: (Training Facility)

During this phase, a classroom/learning center will be established for full utilization. This facility should be set-up in such a way to accommodate traditional and mediated instruction. New computer equipment should be setup in the microcomputer laboratory, and all systems should be checked out. An area of the facility should be established near the laboratory to accommodate independent learning. Videotapes, manuals, slide programs and learning packages should be stored there.

Phase V: (Initial Teaching/Learning Activities)

Prior to engaging in actual classroom instruction, participants will be preselected based on the following criteria:

A. They should have little or no experience with computers or computing.

B. They should have an interest in learning about computers

C. They should be a representation of the various groups of the predefined population and be a random selection from several disciplines.

D. They should be willing to attend the classes.

E. They should be willing to participate in the pilot study.

F. They should be willing to provide information for the revision and upgrading of the program.

All participants will receive a short pretesting exercise. Also during the orientation session, the full program outline will be provided. Most modules will include a 30 minute video-tape, a follow-up lecture and an independent working session on the terminals or learning packages. Other sessions will include lectures supported by other forms of media such as transparencies, slides and appropriate graphic materials.

Phase VI: (Evaluation)

Upon completion of the first fifteen week program, a posttest will be given. This posttest will be compared with the pretest to identify any possible weaknesses in the program. A survey of the participants will also be conducted to solicit possible recommendations for improvement and to measure the attitudes of the participants towards the program and in computing in general.

Phase VII: (Program Revision)

During this stage, information acquired from the evaluation phase will be used to upgrade the program for full implementation. All elements will be considered in order for the program to achieve the highest level of effectiveness. This would include the lecture content, the teaching/training methodology, the content of the instructional materials and the working

sessions.

Phase VIII: (Full Implementation)

After the revisions have been made based on the pilot study, the program will be fully implemented during the next semester. Also during this semester, the second half of the program, "Applications of Computer Based Instruction," will be introduced. This program will follow the same basic implementation strategies as the concepts course. It will run concurrently with the concepts course and many of the people who participated in the pilot study the previous semester will be encouraged to continue in the education applications program.

Phase IX: (Summative Report)

Upon completion of the second semester, a formal summative report will be developed. In this report, the results of the program will be presented. This report will also include future recommendations for use of the models for on-campus workshops and for community utilization.

VI. Program Evaluation

Formative Evaluation:

During the initial development and implementation phase, the participants will be surveyed to determine the relative value of the instructional modules, the learning resources and the working exercises. From this data, the components of the program will be refined and improved. After this phase, a summative evaluation is recommended.

Summative Evaluation:

A summative evaluation should be conducted after the refined program is implemented. The summative evaluation should include a measure of the program's extensiveness, the effectiveness of what actually is learned and a follow up measure to determine how long the concepts endure.

Both forms of evaluation will be useful towards providing information for any future development projects.